WHAT IS CLAIMED IS:

1. A method of decoding a signal vector, the method comprising the steps of:

receiving signal vectors $\mathbf{y}_1 ... \mathbf{y}_k$ into a sub-optimal decoder and generating soft output bits therefrom;

generating a reduced search space V via a reduced search space table creation unit in response to the soft output bits and an estimated channel $\mathbf{H}$; and

generating a signal vector $\hat{\mathbf{s}}_k$ via a maximum likelihood decoding unit in response to the reduced search space V and the signal vectors $\mathbf{y}_1 ... \mathbf{y}_k$.

2. The method according to claim 1,wherein the reduced search space V is constructed by searching over L indices, L>=0 within a transmitted bit vector

3. The method according to claim 2, wherein L has a value that is chosen and fixed only once.

4. The method according to claim 2, wherein L has a value that is chosen adaptively.

5. The method according to claim 2, wherein L has a different value for every receive interval and wherein a receive interval is defined to comprise at least one symbol.

6. The method according to claim 5, wherein the receive interval has a length that is chosen adaptively.

7. The method according to claim 1, wherein the reduced search space V is constructed as a subset of the set of all possible bit combinations in L indices, L>=0, of a transmitted bit vector, where the size of the subset is >=0.

8. The method according to claim 7, wherein L has a value that is chosen and fixed only once.

9. The method according to claim 7, wherein L has a value that is chosen adaptively.

10. The method according to claim 7, wherein L has a different value for every receive interval and wherein a receive interval is defined to comprise at least one symbol.

11. The method according to claim 10, wherein the receive interval has a length that is chosen adaptively.

12. The method according to claim 7, wherein the subset is defined adaptively.

13. The method according to claim 7, wherein the subset is predetermined.

14. The method according to claim 1, wherein the signal vector $\hat{S}$ is represented by the relationship $\hat{S} = \arg\min_{\mathbf{v}\in V} m(\mathbf{y}_1,...,\mathbf{y}_k,\mathbf{v})$, and wherein m is some metric.

15. The method according to claim 14, wherein m varies with the estimated channel **H**.

16. The method according to claim 14, wherein m does not vary with the estimated channel **H**.

17. The method according to claim 1 further comprising the step of generating hard bits via a minimum distance decoding unit in response to the reduced search space V and the signal vectors $\mathbf{y}_1...\mathbf{y}_k$.

18. The method according to claim 1 further comprising the step of generating soft bits via a minimum distance decoding unit in response to the reduced search space V and the signal vectors $\mathbf{y}_1...\mathbf{y}_k$.

19. A reduced search space decoder comprising:

a sub-optimal decoder configured to receive a signal vector $\mathbf{y}_1...\mathbf{y}_k$ and generate soft output bits therefrom;

a decision unit configured to generate a set E of error bit error patterns;

a reduced search space table creation unit configured to generate a reduced search space V in response to the soft output bits and the indexes; and

a minimum distance decoder configured to generate a multidimensional signal $\hat{S}$ in response to the reduced search space V and the signal vector $\mathbf{y}_1...\mathbf{y}_k$.

20. The reduced search space decoder according to claim 19 wherein the minimum distance decoder is further configured to generate hard bits in response to the reduced search space V and the signal vectors $\mathbf{y}_1...\mathbf{y}_k$.

21. The reduced search space decoder according to claim 19 wherein the minimum distance decoder is further configured to generate soft bits in response to the reduced search space V and the signal vectors $\mathbf{y}_1...\mathbf{y}_k$.

22. A reduced search space decoder comprising:

a reduced search space (RSS) decoder configured to receive symbol vectors $\mathbf{y}_1...\mathbf{y}_k$ and generate a hard symbol vector estimate $\tilde{S}$ therefrom; and

an interference cancellation decoder configured to generate a hard symbol vector $\hat{S}$ in response to the symbol vectors $\mathbf{y}_1...\mathbf{y}_k$ and the hard symbol vector estimate $\tilde{S}$.

23. The reduced search space decoder according to claim 22 wherein the interference cancellation decoder is further configured to generate hard bits and soft bits in response to the symbol vectors $\mathbf{y}_1...\mathbf{y}_k$ and the hard symbol vector estimate $\tilde{S}$.

24. A method of decoding a signal vector, the method comprising the steps of:

receiving a symbol vector $\mathbf{y}_1 \ldots \mathbf{y}_k$ via a reduced search space maximum likelihood decoder and generating a hard symbol vector estimate $\tilde{S}$ therefrom; and

decoding the hard symbol vector estimate $\tilde{S}$ via interference cancellation on each symbol and making a decision associated with the received symbol vector $\mathbf{y}_1 \ldots \mathbf{y}_k$ and the hard symbol vector estimate $\tilde{S}$ to generate a symbol vector $\hat{S}$.

25. The method according to claim 24 wherein the step of decoding the hard symbol vector estimate $\tilde{S}$ via interference cancellation on each symbol and making a decision comprises decoding the hard symbol vector estimate $\tilde{S}$ via two layer zero-forcing.